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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: US Patent Application 09/934,817  
Filed August 21, 2001  
Title Optical Arrangement and Projection Illumination Equipment for  
Microlithography with Passive Thermal Compensation  
Applicant Wagner  
Art Unit 2171  
Examiner Etienne Pierre LeRoux  
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Attorney Docket (Z) C98003 P US



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Attention: This responds to the Notification of Non-Compliance with 37 CFR 1.192 ( c ) mailed June 18, 2004. This re-submitted Appeal Brief is submitted in triplicate by express mail (with express mail certification) to the above-identified address on July 16, 2004.

Resubmitted Appeal Brief Filed Under 37 CFR 1.192

REAL PARTY IN INTEREST

The real party in interest is Carl Zeiss SMT AG.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1-37 and 39-41 are in the case. These claims were subject to final rejection.

Claims 38 and 42-44 are cancelled.

STATUS OF AMENDMENTS

An Amendment After Final Rejection was filed December 15, 2003.

SUMMARY OF THE INVENTION

Claim Group 1 includes:

Claim 1 and the claims dependent on claim 1 (claims 5, 6, 11, 13, 17, 21, 28, 26, 35 and 39) cover an optical arrangement comprising a light source that emits radiation and a connecting structure between an optical element fastened to a mount having a symmetry characteristic that substantially does not correspond to the shape of the optical element. This is shown in Figures 1 and 2 and described in the specification.

Claim Group 2 includes:

Claim 2 and claims dependent on claim 2 (claims 7, 8, 14, 18, 22 , 27 and 28) cover the optical arrangement similar to claim 1 with the addition of a single or multi-part thermally conducting element having a form of a heat transport that effects an at least partial compensation of the asymmetry of temperature distribution in the optical element. This arrangement also is shown in Figures 1 and 2 and the description in the specification covering these Figures.

Claim Group 3 includes:

Claim 3 and claims dependent on claim 3 (claims 9, 10, 15, 19, 29, 30, 31 and 41) cover a projection exposure system including an optical element that is heated by radiation in a manner that lacks rotation symmetry and a cooling system for the optical element that lacks rotation symmetry. The cooling system includes passive thermally conducting elements that affect cooling in which the thermally conducting elements comprise adjustable portions. This is shown in Figure 4 and the description of Figure 4 in the specification.

Claim Group 4 includes:

Claim 4 and claims dependent on claim 4 (claims 11, 12, 16, 20, 24, 32, 33, and 34) are similar to claim 3 and further specify that at least one passive thermally conducting part of the thermal conductor comprises a plurality of different materials in which at least one passive

thermally conducting part is at least partially adjustable. This covers the embodiment of Figure 4.

#### GROUPING OF CLAIMS

The claims covered by Groups 1-4 do not stand or fall together.

#### ISSUES AND ARGUMENT

Claims 1, 36 and 37 are rejected as anticipated under 35 USC 102(b) by the Patent to Hyatt. Valid Rejection under 35 USC 102(b) requires that each feature of a rejected claim be disclosed in a single reference either explicitly or impliedly. Hyatt does not disclose or suggest each feature of the rejected claims. Hyatt neither shows nor describes the claimed feature of a “connecting structure between the optical element and the mount having asymmetry characteristic that substantially does not correspond to the shape of the optical element” but just the opposite.

This rejection is based on a misinterpretation of the following term:

“a connecting structure between said optical element and said mount, having a symmetry characteristic...”

In view of paragraph [0008] of the specification (and elsewhere)

“A connecting structure between the optical element and the mount has a symmetry....”.

The claim language clearly is intended to read:

“a structure having a symmetry”,

wherein the structure is qualified as

“a connecting structure between said mount and said optical element” (sequence changed to show the sequence is not significant.)

The “Response to Arguments” in numbered section 5 on page 8, bottom, of the Office Action, states that Hyatt’s Fig. 16 F shows the mounting structure clearly lacks a symmetry.

To clarify the claim without any change to its scope, Claim 1 was amended to read:

“a connecting structure between said mount and said optical element ~~and said mount~~, having a symmetry...”

The “radiation that lacks symmetry....” feature is connected to Fig 13 without any reasoning why Fig. 13 would be related to this feature or to its context, or to Figs. 16.

The description of Fig. 13, col. 6, lines 26-28 clearly states that it shows electro-optical elements, not any radiation. Its discussion in col. 23 “Segment arrays” shows that it is not meant to create geometrically structured light, but integrally varied intensities over its full cross section. Nowhere in the “Electro-optical Thermal Design” chapter starting at col. 50 and leading to and including the description of cited Figs. 16 a - f at col. 53 - col. 56 is Fig 13 recited. So it is in no way shown what the Examiner’s recital of Fig. 13 in the context of Figs. 16 a-f could mean.

Claims 1-12, 17-35, 43 and 44 are rejected under 35 USC 103 as being unpatentable over Unno in view of Nishi. Nishi in no way addresses cooling of lenses. And Unno is diametrical to the idea of passive thermal compensation and hence gives no suggestion at all for a combination with Nishi. The importance of these distinctions from the present invention is discussed later in these arguments.

Valid rejection under 35 USC 103(a) requires evidence of a suggestion or motivation for one skilled in the art to combine prior art references to produce the claimed invention. US Court of Appeals for the Federal Circuit (*Ecolchem inc. v Southern California Edison Co.*, Fed. Cir., No. 99/1043, 9/7/00).

The best defense against hindsight-based obviousness analysis is the rigorous application of the requirement for showing a teaching or motivation to combine the prior art references, according to the court.

Unno and Nishi do not motivate or suggest to one skilled in the art to combine these references to produce Applicant's claimed invention.

Court of Appeals for the Federal Circuit confirmed the above principles in *In Re Sang-Su Lee* (00-1158). The court analyzed 35 USC 103 requirements starting from the Administrative Procedure Act and held (citations omitted):

"Tribunals of the PTO are governed by the Administrative Procedure Act, and their rulings receive the same judicial deference as do tribunals of other administrative agencies.

"The Administrative Procedure Act, which governs the proceedings of administrative agencies and related judicial review, establishes a scheme of "reasoned decision making." Not only must an agency's decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational.

"As applied to the determination of patentability vel non when the issue is obviousness, it is fundamental that rejections under 35 USC §103 must be based on evidence comprehended by the language of that section. (Emphasis added). When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. (Emphasis added)

"The factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of record. This precedent has been reinforced in myriad

decisions, and cannot be dispensed with. Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. There must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the Applicant. Teachings of references can be combined only if there is some suggestion or incentive to do so.”

MPEP 2142 draws from this judicial analysis to set further and confirm “The Legal Concept of *Prima Facie* Obviousness.”

To establish a *prima facie* case of obviousness under 35 USC 103(a) the initial burden is on the Examiner to provide some suggestion of the desirability of doing what the inventor has done. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or imply suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” (MPEP 706.02(j))

**Unno and Nishi do not motivate or suggest to a person skilled in the art to combine these references to duplicate the claims of the present invention.**

In Figure 2 of Nishi, reference numerals G1, G2, are described at column 11, line 22 to column 12, line 22. G1, G2 are identified as “lens frames” and nothing is described about their geometry.

Only column 11, line 39, provides information concerning their geometry: “a gas chamber enclosed by the lens elements 33, 34 and the lens frame G1 is sealed, ...”.

Lenses are rotationally symmetrical, so generally are the lens barrels 4. The frames G1, G2 in order to seal chambers then must be annular parts. This is a widespread basic form of lens moments. The existence of small bores/tubes through the frames G1, G2 does not change this except theoretically. Deviation from rotational symmetry is too small for all mechanical and thermal effects. The word “corresponding” in claim 1 is understood to incorporate such minor deviations from the exact matching c.f. discussion of Figures 5a/5b in [0039] f.f.

Nishi in no way addresses cooling of lenses, and any deviations from a rotational symmetric shape of lens frames G1, G2 is only motivated by the demand for gas supply holes. It is not evident that G2 has such bores in the mountings shown as hatched cross sections. Simple holes in lens tube 4 look the same in the cross section and are identical in effect with G2 combined of 4 separate annular mountings.

The referenced patent to Unno is the US counterpart of EP-A 0 678 768, originally cited in the specification of the present application, paragraph [0004].

On page 4 of the Final Rejection the Examiner indeed notes that Unno does not disclose a “mount having a symmetry characteristic that does not correspond to the shape of the optical element.”

Unno is diametrical to the idea of passive thermal compensation and hence gives no suggestion at all for a combination of Unno and Nishi as suggested in the Final Rejection.

None of the cited references addresses passive cooling of optical elements adapted to the geometry of their exposure, and hence all the claims currently on file remain novel and non-obvious.

APPENDIX

An Appendix containing a copy of the claims involved in this Appeal is submitted herewith.

Respectfully submitted,



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M. Robert Kestenbaum





## APPENDIX

In the Claims:

- 1 (Currently Amended).      An optical arrangement, comprising:
- a light source that emits radiation,
  - a mount,
  - an optical element fastened in said mount,
  - wherein said optical element is acted on by said radiation such that a heat supply results from said radiation that lacks symmetry corresponding to the shape of said optical element, and
  - a connecting structure between said mount and said optical element ~~and said~~ ~~mount~~, having a symmetry characteristic that substantially does not correspond to the shape of the optical element.
- 2 (Previously Presented).      An optical arrangement, comprising:
- a light source that emits radiation,
  - a mount,
  - an optical element fastened in said mount,
  - wherein said optical element is acted on by said radiation such that heat that results from said radiation lacks symmetry corresponding to the shape of said optical element, and
  - a single- or multi-part thermally conducting element arranged in operative connection with said optical element and said mount and having a form of heat transport that effects an at least partial compensation of the asymmetry of temperature distribution in said optical element.

3.(Previously Amended) A projection exposure system for microlithography,  
comprising:

an optical element that is heated by radiation in a manner that lacks rotational  
symmetry, and

a cooling system for said optical element that lacks rotational symmetry, said  
cooling system including passive thermally conducting elements that effect  
cooling, in which said thermally conducting elements comprise adjustable  
portions.

4.(Previously Amended) A projection exposure system for microlithography,  
comprising

an optical element that is heated by radiation in a manner that lacks rotational  
symmetry, and

at least one passively thermally conducting part arranged in thermal contact with  
said optical element, which part covers a portion of the cross section of said  
optical element which is not exposed to said radiation, and which part reduces  
temperature gradients in said optical element, in which said at least one passive  
thermally conducting part of a thermal conductor in thermal contact with said  
optical element comprises a plurality of different materials and in which said at  
least one passive thermally conducting part of a thermal conductor in thermal  
contact with said optical element is at least partially adjustable.

5 (Previously Presented). The optical arrangement according to claim 1, in which  
said optical element comprises a transmitting element.

6 (Previously Presented). The optical arrangement according to claim 5, in which

- said transmitting element comprises a lens.
- 7 (Previously Presented). The optical arrangement according to claim 2, in which said optical element comprises a transmitting element.
- 8 (Previously Presented). The optical arrangement according to claim 7, in which said transmitting element comprises a lens.
- 9 (Previously Presented). The projection exposure system according to claim 3, in which said optical element comprises a transmitting element.
- 10 (Previously Presented). The projection exposure system according to claim 9, in which said transmitting element comprises a lens.
- 11 (Previously Presented). The projection exposure system according to claim 4, in which said optical element comprises a transmitting element.
- 12 (Previously Presented). The projection exposure system according to claim 11, in which said transmitting element comprises a lens.
- 13 (Previously Presented). The optical arrangement according to claim 1, in which said optical element comprises a mirror.
- 14 (Previously Presented). The optical arrangement according to claim 2, in which said optical element comprises a mirror.
- 15 (Previously Presented). The projection exposure system according to claim 3, in which said optical element comprises a mirror.
- 16 (Previously Presented). The projection exposure system according to claim 4, in which said optical element comprises a mirror.
- 17 (Previously Presented). The optical arrangement according to claim 1, having a slit-shaped image field.

- 18 (Previously Presented). The optical arrangement according to claim 2, having a slit-shaped image field.
- 19 (Previously Presented). The projection exposure system according to claim 3, having a slit-shaped image field.
- 20 (Previously Presented). The projection exposure system according to claim 4, having a slit-shaped image field.
- 21 (Previously Presented). The optical arrangement according to claim 5, in which said optical element is arranged near a field plane.
- 22 (Previously Presented). The optical arrangement according to claim 7, in which said optical element is arranged near a field plane.
- 23 (Previously Presented). The projection exposure system according to claim 9, in which said optical element is arranged near a field plane.
- 24 (Previously Presented). The projection exposure system according to claim 11, in which said optical element is arranged near a field plane.
- 25 (Previously Presented). The optical arrangement according to claim 1, further comprising a reticle, the illumination of which lacks rotational symmetry.
- 26 (Previously Presented). The optical arrangement according to claim 25, in which said reticle illumination consists of off-axis, dipole or quadrupole illumination.
- 27 (Previously Presented). The optical arrangement according to claim 2, further comprising a reticle, the illumination of which lacks rotational symmetry.
- 28 (Previously Presented). The optical arrangement according to claim 27, in which said reticle illumination consists of off-axis, dipole or quadrupole illumination type.

- 29 (Previously Presented). The projection exposure system according claim 3, further comprising a reticle, the illumination of which lacks rotational symmetry.
- 30 (Previously Presented). The projection exposure system according to claim 29, in which said reticle illumination consists of off-axis, dipole or quadrupole illumination type.
- 31 (Previously Presented). The projection exposure system according to claim 29, in which said optical element is arranged near a pupil plane.
- 32 (Previously Presented). The projection exposure system according to claim 4, further comprising a reticle, the illumination of which lacks rotational symmetry.
- 33 (Previously Presented). The projection exposure system according to claim 32, in which said reticle illumination consists of off-axis, dipole or quadrupole illumination type.
- 34 (Previously Presented). The projection exposure system according to claim 32, in which said optical element is arranged near a pupil plane.
- 35 (Previously Presented). The optical arrangement according to claim 1, in which said connecting structure comprises portions of different materials.
- 36 (Previously Presented). An optical arrangement comprising:
- a light source that emits radiation,
  - a mount,
  - an optical element fastened to said mount,
  - wherein said optical element is acted on by said radiation such that heat that results from said radiation lacks symmetry corresponding to the shape of said optical element, and

a single- or multi-part passive thermally conducting element arranged in operative connection with said optical element and said mount and having a form of heat transport that effects an at least partial compensation of the asymmetry of temperature distribution in said optical element,  
wherein said passive thermally conducting element comprises an assembly of portions of different material.

37 (Cancelled)

38.(Cancelled)

39 (Previously Presented). The optical arrangement according to claim 1, in which said connecting structure comprises adjustable portions.

40 (Previously Presented). The optical arrangement according to claim 2, in which said thermally conducting element is adjustable.

41 (Previously Presented). The projection exposure system according to claim 3, in which said thermally conducting elements comprise adjustable portions.

42.(Cancelled)

43.(Cancelled)

44.(Cancelled)